

1 (f) repeating step (e) in a stepwise fashion until each reaction vessel contains
2 either a singly labeled micro-particle having a unique reporter signature associated with that reaction
3 vessel, or a combination of singly labeled micro-particles having a unique reporter signature
4 associated therewith.

5 6. (Amended) The method of Claim 3, further comprising the step of introducing a plurality
6 of beads into each reaction vessel to generate said desired labeled bead library under conditions
7 favorable to allowing substantially all singly labeled micro-particle or combinations of singly labeled
8 micro-particles in the reaction vessels to attach to the plurality of beads, to produce a plurality of
9 reporter labeled beads.

10 ~~Please add new Claims 8-40 as follows:~~

11 --8. A method of constructing a library of optically distinct reporter labeled carriers, said
12 method comprising the steps of:

- 13 (a) providing a plurality of optically distinct carriers;
14 (b) providing a plurality of reaction vessels, such that at least one reaction vessel is
15 available for each unique member of the library to be constructed;
16 (c) providing a plurality of optically distinct reporters;
17 (d) in each reaction vessel, apportioning at least one carrier and at least one
18 reporter in a predetermined unique combination; and
19 (e) attaching said at least one reporter to said at least one carrier in each reaction
20 vessel, by at least one of a physical attachment and a chemical attachment.

21 9. The method of Claim 8, wherein no reaction vessel contains a mixture of different
22 optically distinct carriers.

23 10. The method of Claim 8, wherein said plurality of optically distinct reporters and said
24 plurality of optically distinct carriers are optically distinguishable based on size.

25 11. The method of Claim 8, wherein said plurality of optically distinct reporters and said
26 plurality of optically distinct carriers are optically distinguishable based on intensity.

27 12. The method of Claim 8, wherein said plurality of optically distinct reporters and said
28 plurality of optically distinct carriers are optically distinguishable based on shape.

29 13. A method of constructing an optically discriminable reporter that is distinguishable by
30 a specific imaging system used to optically distinguish said optically discriminable reporter,
31 comprising the steps of:

- 32 (a) providing a plurality of singly labeled microparticles, each singly labeled
33 microparticle having a uniquely identifiable optical characteristic, each singly labeled microparticle
34 being smaller than a resolution limit of said specific imaging system employed to optically
35 distinguish said optically discriminable reporter; and

1 (b) combining a plurality of said singly labeled microparticles together to generate
2 an aggregate reporter having a size larger than said resolution limit, to enable the aggregate reporter
3 to be optically distinguished by said specific imaging system.

4 14. The method of Claim 13, wherein each singly labeled microparticle comprises one of
5 a quantum dot and a micro-bead.

6 15. The method of Claim 13, wherein the uniquely identifiable characteristic comprises a
7 color.

8 16. The method of Claim 13, wherein the uniquely identifiable characteristic comprises an
9 intensity.

10 17. The method of Claim 13, wherein each of the plurality of singly labeled microparticles
11 comprising said aggregate reporter comprises has an identical uniquely identifiable characteristic.

12 18. The method of Claim 13, wherein said aggregate reporter comprises at least two
13 groups of singly labeled microparticles each group having a different uniquely identifiable
14 characteristic.

15 19. A method of constructing a plurality of reporters comprising the steps of:

16 (a) providing a plurality of singly labeled microparticles that individually are
17 incapable of functioning as reporters, each singly labeled microparticle having a uniquely identifiable
18 characteristic, each singly labeled microparticle being smaller than a resolution limit of an imaging
19 system that is to be employed to optically distinguish said plurality of reporters;

20 (b) determining a number of unique reporters desired, each unique reporter being
21 indicated by the uniquely identifiable characteristics of said plurality of singly labeled microparticles;

22 (c) providing a plurality of separate reaction vessels, such that a different separate
23 reaction vessel is provided for each unique reporter desired, each separate reaction vessel being
24 associated with a different unique reporter;

25 (d) apportioning said singly labeled microparticles among the plurality of reaction
26 vessels, such that each reaction vessel contains at least one of each singly labeled microparticle
27 required to generate a unique reporter signature associated with that reaction vessel;

28 (e) for each reaction vessel other singly labeled microparticles to generate the unique
29 reporter signature associated with that reaction vessel, adding the other singly labeled microparticles until
30 substantially all singly labeled microparticles in that reaction vessel have combined; and

31 (f) repeating step (e) in a stepwise fashion until each reaction vessel contains an
32 aggregate of singly labeled microparticle defining the unique reporter signature associated with that
33 reaction vessel.

34 20. The method of Claim 19, wherein each singly labeled microparticle comprises one of
35 a quantum dot and a micro-bead.

1 21. The method of Claim 19, wherein the uniquely identifiable characteristic is a color.
2 22. The method of Claim 19, wherein the uniquely identifiable characteristic is an
3 intensity.
4 23. The method of Claim 19, wherein the uniquely identifiable characteristic is a shape.
5 24. A method of preparing a library of diverse compounds, each compound including a
6 plurality of components and being produced by a combination of a directed synthesis and a
7 combinatorial synthesis, said method comprising the steps of:
8 (a) providing a plurality of optically distinct carriers;
9 (b) providing a plurality of reaction vessels, such that a different reaction vessel is
10 available for each different type of optically distinct carrier;
11 (c) apportioning said plurality of optically distinct carriers among said plurality of
12 reaction vessels, such that each reaction vessel contains only one type of optically distinct carrier;
13 (d) in each of said plurality of reaction vessels, performing a directed synthesis by
14 exposing said optically distinct carriers to a plurality of first components until substantially all
15 optically distinct carriers have coupled to at least one first component, a different first component
16 being added to each reaction vessel, such that each type of optically distinct carrier identifies a
17 different first component;
18 (e) pooling contents from each reaction vessel, to form a common pool comprising
19 said plurality of optically distinct carriers;
20 (f) apportioning the common pool among said plurality of reaction vessels, such
21 that each reaction vessel contains a mixture of different optically distinct carriers and first
22 components;
23 (g) in each reaction vessel, exposing each mixture to a plurality of optically
24 distinct first reporters, until substantially all optically distinct carriers have at least one optically
25 distinct first reporter coupled thereto, a different optically distinct first reporter being added to each
26 reaction vessel; and
27 (h) performing a combinatorial synthesis by exposing each mixture of different
28 optically distinct carriers, different first components, and different optically distinct first reporters in
29 each reaction vessel to a plurality of second components, until substantially all optically distinct
30 carriers have at least one second component coupled thereto, a different second component being
31 added to each reaction vessel, such that each different optically distinct first reporter identifies a
32 different second component.
33 25. The method of Claim 24, wherein after the step of exposing each mixture of different
34 optically distinct carriers, different first components and different optically distinct first reporters to a
35 plurality of second first components, further comprising the steps of:

1 (a) pooling the contents of each reaction vessel to form a second common pool;
2 (b) apportioning said second pool among said plurality of reaction vessels, such
3 that each reaction vessel contains a second mixture of different optically distinct carriers, first
4 components, optically distinct first reporters, and second components;
5 (c) in each reaction vessel of said plurality of reaction vessels, exposing each
6 second mixture of different optically distinct carriers, first components, first reporters, and second
7 components to a plurality of optically distinct second reporters, until substantially all optically
8 distinct carriers have at least one optically distinct second reporter coupled thereto, a different second
9 optically distinct reporter being added to each reaction vessel; and
10 (d) performing a combinatorial synthesis by exposing each second mixture of
11 different optically distinct carriers, first components, optically distinct first reporters, second
12 components, and optically distinct second reporters to a plurality of third components, until
13 substantially all optically distinct carriers have at least one third component coupled thereto, a
14 different third component being added to each different reaction vessel, such that each type of
15 optically distinct second reporter identifies a different third component.
16 26. The method of Claim 25, further comprising the step of repeating the steps of pooling,
17 apportioning, exposing to a different reporter, and exposing to a different component, as in Claim 25,
18 until a desired number of components have been added to said plurality of optically distinct carriers.
19 27. The method of Claim 24, wherein said plurality of optically distinct carriers are
20 optically distinguishable based on size.
21 28. The method of Claim 24, wherein said plurality of optically distinct carriers are
22 optically distinguishable based on intensity.
23 29. The method of Claim 24, wherein said plurality of optically distinct carriers are
24 optically distinguishable based on shape.
25 30. The method of Claim 24, wherein each different optically distinct reporter is optically
26 distinguishable based on size.
27 31. The method of Claim 24, wherein each different optically distinct reporter is optically
28 distinguishable based on light intensity.
29 32. The method of Claim 24, wherein each different optically distinct reporter is optically
30 distinguishable based on shape.
31 33. The method of Claim 24, wherein after the step of exposing each mixture of different
32 optically distinct carriers, different first components and different optically distinct first reporters to a
33 plurality of second components, further comprising the steps of:

34 (a) pooling the contents of each reaction vessel to form a second common pool;

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1 (b) apportioning said common pool among less than all of said plurality of
2 reaction vessels, such that at least one reaction vessel remains empty, and that a remainder of the
3 plurality of reaction vessels each contains the mixture of different optically distinct carriers, first
4 components, first optically distinct reporters, and second components;

5 (c) in each of the remainder of reaction vessels, exposing each mixture of different
6 optically distinct carriers, first components, first optically distinct reporters, and second components
7 to a plurality of optically distinct second reporters, until substantially all optically distinct carriers are
8 coupled to at least one optically distinct second reporter, a different second reporter being added to
9 each of the remainder of the reaction vessel; and

10 (d) performing a constrained combinatorial synthesis in each of the remainder of the
11 reaction vessels by exposing each mixture of different optically distinct carriers, first components, first
12 optically distinct reporters, second components and second optically distinct reporters to a plurality of
13 third components, until substantially all optically distinct carriers are coupled to at least one third
14 component, a different third component being added to each of the remainder of the reaction vessels, such
15 that each type of optically distinct second reporter identifies a different third component.

16 34. A method of preparing a library of diverse compounds by a step-wise synthesis, each
17 compound including a plurality of components, comprising the steps of:

18 (a) providing a plurality of reaction vessels, such that a different reaction vessel is
19 provided for each different compound to be prepared;

20 (b) providing a plurality of optically distinct carriers of different types, fewer
21 different types of optically distinct carriers being provided than a number of the reaction vessels that
22 are provided;

23 (c) apportioning said plurality of optically distinct carriers among said plurality of
24 reaction vessels, such that at least two reaction vessels contain an identical type of optically distinct
25 carrier;

26 (d) in each reaction vessel of said plurality of reaction vessels, exposing said
27 optically distinct carriers to a plurality of first components, until substantially all optically distinct
28 carriers have at least one first component coupled thereto, identical first components being added to
29 each reaction vessel that contains the identical type of optically distinct carrier; and

30 (e) in each reaction vessel of said plurality of reaction vessels, exposing said
31 optically distinct carriers to a plurality of second components, until substantially all optically distinct
32 carriers coupled to at least one second component, identical second components being added to each
33 reaction vessel that contains the identical type of optically distinct carrier, such that each different
34 type of optically distinct carrier uniquely identifies a specific combination of first and second
35 components.

1 35. The method of Claim 34, wherein after the step of exposing said optically distinct
2 carriers to a plurality of second components, further comprising the steps of:

3 (a) in each reaction vessel, exposing said optically distinct carriers to a plurality of
4 third components, until substantially all optically distinct carriers are coupled to at least one third
5 component, different types of third components being added to each reaction vessel that contains the
6 identical type of optically distinct carrier; and

7 (b) in each reaction vessel, exposing said optically distinct carriers to a plurality of
8 optically distinct first reporters, until substantially all optically distinct carriers are coupled to at least
9 one first optically distinct first reporter, an identical optically distinct first reporter being added to
10 each reaction vessel containing the same third component, such that each type of optically distinct
11 first reporter identifies a different third component.

12 36. The method of Claim 35, wherein in each reaction vessel, after the step of exposing
13 said optically distinct carriers to a plurality of optically distinct first reporters, further comprising the
14 step of exposing said optically distinct carriers to a plurality of fourth components, until substantially
15 all optically distinct carriers are coupled to have at least one fourth component, the identical type of
16 fourth component being added to each reaction vessel, such that each type of optically distinct first
17 reporter uniquely identifies a specific combination of third and fourth components.

18 37. A method of preparing a library of different compounds by a step-wise synthesis, each
19 compound including at least one component and being uniquely identified by a plurality of optically
20 distinct reporters, said plurality of optically distinct reporters being added in a single portion of said
21 step-wise synthesis, said method comprising the steps of:

22 (a) providing a plurality of carriers;

23 (b) providing a plurality of reaction vessels, such that a separate reaction vessel is
24 provided for each different compound to be prepared;

25 (c) providing a plurality of optically distinct reporters of different types, such that
26 a sufficient number of different types of optically distinct reporters are provided so as to enable each
27 different compound to be prepared to be uniquely identifiable using a unique combination of
28 optically distinct reporters;

29 (d) apportioning said plurality of carriers among said plurality of reaction vessels;

30 (e) in each reaction vessel, exposing said plurality of carriers contained therein to
31 a different combination of optically distinct reporters, until substantially all carriers are coupled to at
32 least one combination of optically distinct reporters, carriers in different reaction vessels thus
33 exposed having different optical signatures, due to the different combination of optically distinct
34 reporters; and

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1 (f) in each reaction vessel, exposing said plurality of carriers to a plurality of first
2 components, until substantially all of the plurality of carriers are coupled to at least one first
3 component.

4 38. The method of Claim 37, wherein for each reaction vessel that was provided for a
5 compound that requires at least another component, further comprising the step of exposing said
6 plurality of carriers to any other components thus required, in a step-wise fashion, until each reaction
7 vessel contains the compound for which the reaction vessel was provided.

8 39. A method of preparing a library of different compounds by a step-wise synthesis, each
9 different compound being uniquely identified by a plurality of optically distinct reporters, said
10 method comprising the steps of:

11 (a) providing a plurality of carriers;

12 (b) providing a plurality of reaction vessels, such that a separate reaction vessel is
13 provided for each different compound to be prepared;

14 (c) providing a plurality of optically distinct reporters of different types, such that
15 a sufficient number of different types of optically distinct reporters are provided so as to enable each
16 different compound to be prepared to be uniquely identifiable using a unique combination of
17 optically distinct reporters;

18 (d) apportioning said plurality of carriers among said plurality of reaction vessels;

19 (e) in each reaction vessel of said plurality of reaction vessels, exposing said
20 plurality of carriers to a different combination of optically distinct reporters, until substantially all of
21 the plurality of carriers are coupled to at least one combination of optically distinct reporters, carriers
22 from different reaction vessels comprising different optical signatures, due to the different
23 combination of optically distinct reporters added to each reaction vessel; and

24 (f) in each reaction vessel, exposing said plurality of carriers to a plurality of
25 compounds, until substantially all of the plurality of carriers are coupled to at least one compound
26 coupled, a different compound being added to each reaction vessel.

27 40. A method of constructing an optically discriminable reporter that is distinguishable by
28 a specific imaging system used to optically distinguish said optically discriminable reporter,
29 comprising the steps of:

30 (a) providing a plurality of singly labeled microparticles, each singly labeled
31 microparticle having a uniquely identifiable optical characteristic, each singly labeled microparticle
32 being smaller than a resolution limit of said specific imaging system employed to optically
33 distinguish said optically discriminable reporter; and

34 (b) combining a plurality of said singly labeled microparticles together to generate
35 an aggregate reporter having a size that is still smaller than said resolution limit, the aggregate